Quiz 4

This is a preview of the published version of the quiz

Started: Sep 26 at 4:25am

Quiz Instructions

Once you open this quiz, you will have 25 minutes to submit it. You will have only one submission attempt. The quiz must be submitted by 7:59 PM (Atlanta time) on Friday, Sep 25. There are 5 questions after the honor code pledge.

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Question 1

Please read and attest to the honor statement below:

I understand that this assessment is open-book and open-note, but not open-internet. I may use my class notes, my instructor's notes, and the ILA textbook at https://textbooks.math.gatech.edu/ila/ila.pdf.

However, I will not visit any other websites, use any search engines, or use any calculators or computer aids whatsoever (Matlab, Mathematica, Chegg.com, Geogebra, etc.) as I take this assessment.

This assessment is completely my own work. I will not discuss the answers or any of the contents of this assessment with anyone until the time it is due.

☐ I attest to my integrity, and I understand that any suspected violation of this policy may be prosecuted to the fullest extent allowable by Georgia Tech.

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Question 2

Let $V$ be the set of vectors in $\mathbb{R}^3$ given by $\{(a, b, c) \in \mathbb{R}^3 \mid a = -c$ and $b = 0\}$. 
(a) Does $V$ contain the 0 vector? [Select]

(b) Is $V$ closed under addition? In other words, if $u$ and $v$ are in $V$ does it follow that $u + v$ is in $V$? [Select]

(c) Is $V$ closed under scalar multiplication? In other words if $v$ is in $V$ and $c$ is a real number does it follow that $cv$ is in $V$? [Select]

(d) Is $V$ a subspace of $\mathbb{R}^3$? [Select]

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**Question 3**

Let $V$ be the set of vectors in $\mathbb{R}^3$ given by $\{(a, b, c) \in \mathbb{R}^3 \mid c \geq 0\}$.

(a) Does $V$ contain the 0 vector? [Select]

(b) Is $V$ closed under addition? In other words, if $u$ and $v$ are in $V$ does it follow that $u + v$ is in $V$? [Select]
(c) Is $\mathcal{V}$ closed under scalar multiplication? In other words if $v$ is in $\mathcal{V}$ and $c$ is a real number does it follow that $cv$ is in $\mathcal{V}$? [Select ]

(d) Is $\mathcal{V}$ a subspace of $\mathbb{R}^3$? [Select ]

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**Question 4**

1 pts

When is the set of solutions to a matrix equation a subspace?

- Sometimes
- Always
- Never

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**Question 5**

1 pts

Consider the matrix

$$A = \begin{pmatrix} 1 & 2 & 1 & 1 \\ 1 & 4 & 1 & 1 \\ 5 & 6 & 2 & 1 \\ 1 & 2 & 1 & 1 \end{pmatrix},$$

which can be row reduced to the following matrix

$$\begin{pmatrix} 1 & 0 & 0 & -1/3 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 4/3 \\ 0 & 0 & 0 & 0 \end{pmatrix}.$$
Which of the following collection of vectors spans $\text{Col}(A)$?

- \[
\begin{pmatrix}
1 \\
1 \\
5 \\
1
\end{pmatrix}, \begin{pmatrix}
1 \\
2 \\
1 \\
1
\end{pmatrix}, \begin{pmatrix}
1 \\
1 \\
1 \\
1
\end{pmatrix}
\]

- \[
\begin{pmatrix}
1 \\
1 \\
4 \\
5
\end{pmatrix}, \begin{pmatrix}
2 \\
4 \\
6 \\
2
\end{pmatrix}, \begin{pmatrix}
1 \\
1 \\
1 \\
1
\end{pmatrix}
\]

- \[
\begin{pmatrix}
1/3 \\
0 \\
-4/3 \\
1
\end{pmatrix}
\]

- \[
\begin{pmatrix}
1 \\
0 \\
0 \\
0
\end{pmatrix}, \begin{pmatrix}
0 \\
1 \\
0 \\
0
\end{pmatrix}, \begin{pmatrix}
0 \\
0 \\
1 \\
0
\end{pmatrix}
\]

Question 6 1 pts

Suppose that $A$ is a $3 \times 4$ matrix that can be reduced to the following reduced row echelon form

\[
\begin{pmatrix}
1 & 0 & 0 & 1 \\
0 & 0 & 1 & 2 \\
0 & 0 & 0 & 0
\end{pmatrix}.
\]

Which of the following collections of vectors spans $\text{Nul}(A)$?
The first and third columns of the original matrix A

\[
\begin{pmatrix}
0 \\ 1 \\ 0 \\ 0
\end{pmatrix}, \begin{pmatrix}
-1 \\ 0 \\ -2 \\ 1
\end{pmatrix}
\]